

SECTION 10.0

Engineering

Engineering

10.1 Introduction

This section and its related appendices, together with Sections 2, 5, 6, and 7, present information concerning the design and engineering of the San Francisco Electric Reliability Project (SFERP). Subsection 10.2 describes the design of the facility with reference to Section 2, Project Description. Subsection 10.3 discusses the reliability of SFERP. Subsection 10.4 presents the estimated thermal efficiency of the facility. Subsection 10.5 describes the laws, ordinances, regulations, and standards (LORS) applicable to SFERP engineering and identifies agencies that have jurisdiction. Subsection 10.6 provides the contact persons within those agencies.

10.2 Facility Design

A detailed description of the SFERP is provided in Subsection 2.2, Project Description, Design, and Operation. Safety design features are described in Subsection 2.3, Facility Safety Design.

Summary descriptions of the design criteria are included in Appendix 10A, Civil Engineering Design Criteria; Appendix 10B, Structural Engineering Design Criteria; Appendix 10C, Mechanical Engineering Design Criteria; Appendix 10D, Electrical Engineering Design Criteria; Appendix 10E, Control Engineering Design Criteria; and Appendix 10F, Chemical Engineering Design Criteria. Appendix 10G, Geologic and Foundation Design Criteria, sets forth a geotechnical assessment of the SFERP project site.

Design and engineering information and data for the following systems are found in the following parts of the supplement to the Application for Certification (AFC):

- **Power Generation**—Subsection 2.2, Project Description, Design, and Operation
- **Heat Dissipation**—Subsection 2.2, Project Description, Design, and Operation
- **Cooling Water Supply System**—Subsection 2.2, Project Description, Design, and Operation
- **Air Emission Control System**—Subsection 2.2, Project Description, Design, and Operation, and Subsection 8.1, Air Quality
- **Waste Disposal System**—Subsection 2.2, Project Description, Design, and Operation, and Subsection 8.13, Waste Management
- **Noise Abatement System**—Subsection 8.5, Noise
- **Switchyards/Transformer Systems**—Section 5, Electric Transmission

10.3 Reliability

This section discusses the availability of fuel, the expected service life of the plant, and the degree of reliability to be achieved by SFERP.

10.3.1 Fuel Availability

The approximately 900-foot natural gas supply pipeline to SFERP will be connected to Pacific Gas and Electric Company's (PG&E's) Line 101, which is one of three supply lines to PG&E's San Francisco Load Center located adjacent to PG&E's Potrero Substation. The San Francisco Load Center is supplied by three natural gas lines (101, 109, and 132), which will provide the SFERP facility with a reliable source of natural gas. The SFERP facility has no backup fuel supply.

10.3.2 Plant Availability

SFERP is a peaking facility and therefore does not have some redundancy that a base load plant may require. SFERP will be designed for an operating life of 30 years. Reliability and availability projections are based on this operating life; however, the actual operating life will be based on City of San Francisco (City) policy, economics, and other factors. Operation and maintenance procedures will be consistent with industry standard practices to maintain the useful life status of plant components.

The SFERP simple-cycle power block consists of three natural gas-fired combustion turbine generators (CTGs). The CTG power block is projected to operate between 15 and 100 percent of the time during each year of its operating life. The percentage of time that the power block is projected to operate is defined as the "service factor." The service factor considers the amount of time that a unit is operating and generating power, whether at full or partial load. The projected service factor for the power block, which considers projected percentage of time of operation, differs from the "equivalent availability factor" (EAF), which considers the projected percentage of energy production capacity achievable. EAF is defined as a weighted average of the percentage of full energy production capacity achievable. The projected EAF for SFERP is estimated to be in the range of 94 to 98 percent. The EAF differs from the "availability of a unit," which is the percentage of time that a unit is available for operation, whether at full load, partial load, or on standby.

10.3.3 Water Availability

Makeup supply water will be process water provided by the City and County of San Francisco (City), which will be treated onsite to California Code of Regulations (CCR) Title 22 recycled water standards. The recycled water plant receives its water from a new City process water supply line from a collection box near Marin and Cesar Chavez streets in San Francisco. A backup supply is provided by an appropriate connection (air gap separation of recycled and potable water systems) to the City potable water system. Process water is produced by an onsite water treatment system from the process water supply. Water for potable use at SFERP is from a connection to the City potable water system in 25th Street. An onsite recycled water storage tank provides enough water for short-term operation and controlled shutdown of the plant. An onsite demineralized water storage tank provides water for short-term periods of operation of the gas turbines.

10.3.4 Wastewater Disposal Availability

SFERP wastewater disposal consists of waste from the recycled water treatment plant, nonhazardous cooling water, and other nonhazardous industrial wastewater streams. This combined stream will be returned to the City combined sewer system. Most hazardous wastes will be collected and recycled by permitted recycling firms, and hazardous wastes that cannot be recycled will be collected by a licensed hazardous waste hauler and deposited in a licensed hazardous waste landfill. For detailed information on the use of hazardous materials and management of wastes, see Subsections 8.12 and 8.13.

10.4 Efficiency

SFERP plant efficiency, approximately 36 percent, is one of the highest thermal efficiencies available from a natural gas-fired, gas-turbine, simple-cycle power plant. This level of efficiency is achieved when each combustion turbine operates at base load (100 percent load) with water injection for performance enhancement and emissions control. Operation at partial output will result in lower efficiencies.

The minimum fuel gas consumption is determined by the minimum operating load on a single CTG.

SFERP's net annual electrical production cannot be forecast accurately because the plant will be operated as a dispatchable power plant. The maximum annual generation possible from the facility is estimated to be roughly 580 gigawatt hours (GWh).

10.5 Laws, Ordinances, Regulations, and Standards

The LORS that are applicable to the design of SFERP are referenced in Table 10-1. LORS applicable to the environmental areas of the AFC (Subsections 8.1 through 8.16) are contained within each of the environmental sections. The project will conform to all of these LORS.

Appendices 10A through 10G contain the discipline design criteria that will be used in SFERP design. Appendices 10A and 10B address the physical design criteria for the site-related features, structures, and foundations of the facility. Appendices 10C through 10F provide the design criteria for SFERP systems and equipment, including the codes and standards that apply to the design, materials, fabrication, and erection of the systems and equipment. The project will also comply fully with these codes and standards.

Appendix 10G, Geologic and Foundation Design Criteria, includes the geotechnical assessment of the MUNI Metro East Maintenance Facility just west of the SFERP project site. A geotechnical assessment of the SFERP site is scheduled and the completed report will be submitted to the California Energy Commission when available.

TABLE 10-1
Applicable Laws, Ordinances, Regulations, and Standards

LORS	Location in Supplement for Facility Design Compliance	Conformance
Federal:		
Occupational Safety and Health Act (OSHA) – 29CFR1910 and 29CFR126	Subsection 8.7	Meet Requirements
Environmental Protection Agency (EPA) – 40CFR60, 40CFR75, 40CFR112, 40CFR302, 40CFR423, 40CFR50, 40CFR100, 40CFR260, 40CFR300, and 40CFR400	Subsection 8.1 and Section 10	Meet Requirements
California:		
California Code of Regulations (CCR) – Title 8, Sections 450 and 750 and Title 24, 1995, Titles 14, 17, 19, 20, 22, 23, and 26.	Section 10	Meet Requirements
California Department of Transportation (Caltrans)-Standard Specifications	Subsection 8.10	Meet Requirements
California Occupational Safety and Health Administration (Cal-OSHA) – Regulations and Standards	Subsection 8.7	Meet Requirement
California Business and Professions Code – Sections 6704, 5730, and 6736	Section 10	Meet Requirements
California Vehicle Code – Section 35780	Subsection 8.10	Meet Requirements
California Labor Code – Section 6500	Subsection 8.7	Meet Requirements
Local:		
City and County of San Francisco – Regulations and Ordinances	Section 10	Meet Requirements
Industrial:		
Civil Engineering Design Criteria	Appendix 10A	Meet Design Criteria
Structural Engineering Design Criteria	Appendix 10B	Meet Design Criteria
Mechanical Engineering Design Criteria	Appendix 10C	Meet Design Criteria
Control Engineering Design Criteria	Appendix 10E	Meet Design Criteria
Chemical Engineering Design Criteria	Appendix 10F	Meet Design Criteria
Geologic and Foundation Design Criteria	Appendix 10G	Meet Design Criteria

10.6 Involved Agencies and Agency Contacts

Table 10-2 contains a list of involved agencies and agency contacts.

TABLE 10-2
Agency Contacts

Agency	Contact	Telephone
CCSF Department of Planning 1660 Mission Street San Francisco, CA 94103	Jasper Rubin, Planner	(415) 558-6310
San Francisco Fire Department	Mary Boucher, Fire Inspector	(415) 558-3306
San Francisco Department of Public Health	Sue Cone, Program Manager	(415) 252-3991